Using Painted Block and Brick as Clean Fill

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We have all seen signs posted at construction sites advertising the need for "clean fill", and probably have given the term little thought. Simply put, clean fill is material used to bring a site to a desired elevation or grade, often to provide a firm base for building or parking lot construction. What most people don't realize is that there is a legal definition of clean fill. The Missouri Solid Waste Management Law defines clean fill as:

> Uncontaminated soil, rock, sand, gravel, concrete, asphaltic concrete, cinder blocks, brick minimal amounts of wood and metal, and inert solids as approved by rule or policy of the department for fill, reclamation or other beneficial uses.

By far the most frequently asked question regarding clean fill is the meaning of the term 'uncontaminated.' There is really no question as to whether virgin natural materials such as soil, sand, and gravel should be used as clean fill. Material that meets this definition may be used as fill in nearly any capacity you chose as long as you don't place it in wetlands, floodplains, or classified waterways without permission from the proper authorities. However, there are some questions surrounding the use of demolition debris such as asphalt, concrete, concrete blocks, and bricks as clean fill, particularly when the material has been painted. Under no circumstances should demolition debris, painted or unpainted, be placed directly in contact with water bodies such as lakes, streams, or rivers. However, if the demolition material described above is clean and unpainted, it is also for more or less unrestricted use.

In January, 2001, the department's technical bulletin titled Managing Construction and Demolition Waste was revised to allow the use of painted demolition debris to be used as clean fill as long as the paint itself is not a heavy metal based paint. Though our policy concerning the use of painted material as clean fill has not yet been fully developed, certain aspects have been determined at this point. Please understand that we consider this policy to be a work in progress, and intend to develop a workable, practical approach to this issue that is protective of the environment. This guidance document outlines the department's policy to date.

What is a heavy metal?

The department has determined that the heavy metals of concern are the eight (8) metals listed in the Code of Federal Regulations, 40 CFR Part 261, Table 1 – Maximum Concentration of Contaminants for the Toxicity Characteristic. These metals are commonly referred to as the Resource Conservation and Recovery Act (RCRA) metals. They are:

arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver.

What testing is required?

Testing can be done either by wet chemistry (total concentration analysis) or by using an x-ray fluorescence (XRF) instrument. Most laboratories in the state are able to routinely perform wet chemistry testing. Acceptable test methods we have seen to date include Environmental Protection Agency (EPA) SW 846, Methods 6010B and 3050B. The sample must be of the paint only, and cannot include the substrate. The results are normally reported in milligrams per kilogram (mg/kg) which is equivalent to parts per million (ppm). Laboratory reports must be included if the information is submitted to the department. Make sure the laboratory report indicates the detection limit of the test method.

XRF testing is more specialized and usually requires that you hire an experienced consultant. We are still learning about this process. However, based on the limited data we have seen to date, we have determined that for XRF testing a detailed report must be submitted containing the following information:

A printout or summary of the test results
Color of paint
Type of paint if known (latex, oil based enamel, etc.)
Number of coats of paint
Type of substrate (bricks, concrete, concrete block, etc.)
Type of application (interior vs. exterior)
Relative roughness of the surface
Test detection limits and how they were derived
Exposure times
Other factors affecting the interpretation of the results, as specified by the instrument manufacturer

What testing frequency should I use?

Regardless of the testing method or the size of the building, the department requires a minimum of one (1) test for each type and color of paint present in each building. Should a particular color or type of paint be present in quantities greater than approximately 5,000 square feet of surface area, one sample of the paint for every 5,000 square feet of painted surface, or fraction thereof, must be collected. In other words, if there are 6,500 square feet of surface area painted with a particular color of paint, two (2) tests are required. For 14,000 square feet, three (3) tests are required, and so on.

When is a paint a heavy metal based paint?

Lead based paint is defined as paint that contains:

- One milligram of lead per square centimeter of surface area, or
- One half of one percent (0.5%) lead (equal to five thousand (5,000) ppm)

This definition is well established, and is used by Housing and Urban Development (HUD) and the Environmental Protection Agency (EPA). No material painted with lead based paint may be used as clean fill, regardless of its origin

We are not aware that there are any other defined heavy metal based paints. This determination will be made by the department on a case by case basis.

Are there different requirements for residential structures vs. non-residential structures?

Yes. For the purposes of this guidance document, residential structures are defined as single family dwellings and multi-family dwellings of up to four family units. For residential structures, lead is the only metal of concern. Testing for other RCRA metals is not necessary. In other words, for residential structures, you must only determine whether the material is painted with lead based paint. If it is not, then material that would otherwise be clean fill may still be used as such. While you should keep the test results in your records, you do not have to submit them to the department for approval.

For non-residential structures, you must test for all eight RCRA metals. As for residential structures, material painted with lead based paint is not acceptable for use as clean fill. However, we have not yet determined the levels of other RCRA metals that classify them as heavy metal based paints. In other words, the acceptable maximum levels for the other RCRA metals in paint on clean fill material from non-residential structures has not yet been determined. However, Table 1, below, gives the maximum levels of RCRA metals in paint on clean fill that have been approved to date. We consider the painted material to be clean fill if testing reveals that the concentrations of RCRA metals in the paint are equal to or below these levels:

Table 1

	As	Ba	Cd	Cr	Pb	Hg	Se	Ag
Maximum approved Levels, ppm	**87**	**15,200**	**429**	**3,285**	**4,999***	**100**	**50**	**99**

* 'Lead-based paint' is defined as paint containing at least 5,000 ppm lead, or 0.5% lead. Material painted with lead based paint may not be used as clean fill. Material coated with paint containing up to 4,999 ppm lead may still be used as clean fill.

If testing reveals that the levels of metal in the paint are below the levels in the table, you may use the material as clean fill without submitting the test results to the department. Keep the test results for your records. If the levels of metal in the paint are above the levels in the table and you still wish to pursue its use as clean fill, you may elect to perform further testing using the

synthetic precipitation leaching procedure (SPLP) test, EPA SW 846, Method 1312, on the paint (with no substrate included). This additional testing is only necessary for those metals found to be above the appropriate levels in Table 1, above. Compare the test results to the water quality standards in the Missouri State Code of Regulations, 10 CSR 20-7, Table A – Criteria for Designated Uses. This table may be viewed by visiting the Missouri Secretary of State's website at following address:

http://www.sos.state.mo.us/adrules/csr/current/10csr/10c20-7b.pdf

If SPLP testing reveals that the concentration of the particular metal in the extract of the material is below the water quality standards for that metal, the material is clean fill. In other words, if the metal doesn't leach out above the *lowest* water quality standard in Table A using the SPLP, it is clean fill. Again, the test results should be kept in your records, but they do not have to be submitted.

If XRF or wet chemistry testing reveals that the concentration of any RCRA metal in the paint, other than lead, is at or above the level for the metal in the table, and you do not wish to perform the additional SPLP tests, the XRF or wet chemistry results must be submitted to the department's SWMP for review. The allowable maximum levels for RCRA metals, other than lead, in paint on clean fill material, will be determined on a case-by-case basis for the immediate future. Table 1 will be revised accordingly as these determinations are made. To reiterate, the maximum level for lead is always the HUD definition of lead based paint, regardless of whether the structure is residential or not.

These procedures are subject to change as data becomes available regarding the metal content and the leachability of metals in paint. Any data you might have in your possession concerning the metal content of paint will assist us in our efforts; we will welcome copies of any test results you may have.

If you have any further questions, please feel free to contact the Special Projects Unit staff at (573) 751-5401.